

***Punctum adami* sp. nov., a new endodontoid snail from the Ruwenzori range, D.R. Congo (Gastropoda, Pulmonata)**

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MOTS-CLEFS. Gastropoda, Pulmonata, Punctidae, Charopidae, *Punctum*, Afrique, R.D. Congo, systématique.

ABSTRACT. *Punctum adami* n. sp. is described from between 915 and 3800 m in the Ruwenzori Range, D.R. Congo. Generic attribution is unclear because of lack of anatomical data, which means that the new taxon also may belong to the genus *Trachycystis* s.l. (family Charopidae). Comparison is made with minute endodontoids from southern, East and Central Africa.

RESUME. Une nouvelle espèce, *Punctum adami* sp.n., vivant dans le massif du Ruwenzori entre 915 et 3800 m d'altitude est décrite. L'affectation générique n'est pas certaine étant donné le manque de données anatomiques. Cela signifie que le nouveau taxon pourrait aussi bien appartenir au genre *Trachycystis* s.l. (Charopidae). La nouvelle espèce est comparée en détail avec de petites espèces d'endodontoides connues de l'Afrique centrale, orientale et méridionale.

INTRODUCTION

Our knowledge of the minute snails belonging to the cryptofauna of Africa is still very incomplete and virtually in its infancy. One of the few authors who have made a significant contribution to this difficult field is Dr W. Adam (1909-1988) of the Brussels Institute. He particularly worked and published on groups such as the Pupillacea. However, he also initiated studies on the small and minute representatives of the endodontoid complex. What used to be the large family Endodontidae (cf. e.g., Zilch, 1959: 203-230) has been split up by Solem (1976, 1983) into three families: Punctidae Morse, 1864, Charopidae Hutton, 1884, and Endodontidae Pilsbry, 1895. Two of these families are represented in Africa, viz., the Punctidae (African genera: *Punctum* Morse, 1864; *Toltecia* Pilsbry, 1926) and the Charopidae (African genera: *Trachycystis*

Pilsbry, 1893. s.l.; *Afropunctum* Haas, 1934; *Afrodonta* Melvill & Ponsonby, 1908; *Prositata* Germain, 1915). The genus *Trachycystis* is here considered *sensu lato* mainly as interpreted by Connolly (1939). In the view of the senior author it is evident that this large genus is polyphyletic and that it has to be split up into a number of monophyletic units.¹

Unfortunately Adam's studies on these groups never came to fruition, leaving a number of professional drawings by Mrs J. Van Melderden-Sergysels without accompanying notes. The authors have now studied some of this material resulting in the description of a new species of *Punctum*, whereby good use is made of the available drawings.

¹ Verdcourt (1991a: 353) takes a much stronger view and literally writes about "*Trachycystis sensu latissimo*"!

Incidentally, the availability of these minute shells is a tribute to the sorting ability of the technical staff in the Brussels Institute.

Abbreviations used

- RBINS: Royal Belgian Institute of Natural Sciences, Brussels (Institut royal des Sciences naturelles de Belgique, Bruxelles / Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel)
- RMNH: National Museum of Natural History, Leiden (Nationaal Natuurhistorisch Museum, formerly Rijksmuseum van Natuurlijke Historie)
- D.R. Congo: Democratic Republic of Congo
- PNV: Virunga National Park [Parc National des Virunga, formerly Albert National Park / Parc National Albert, officially divided into three sectors, *i.e.* the northern (north of Lake Edward), central (around and south of Lake Edward), and southern (from the Rutshuru River to Lake Kivu) sectors], D.R. Congo
- l/d: the ratio length [or height] / major diameter [or width] as an indication of the shape of the shell. (In most cases the l/d has been calculated from micrometer readings, so that the l/d values do not always agree with those calculated from the dimensions in mm).

Generic assignment: *Punctum* (Punctidae) or *Trachycystis* (Charopidae)?

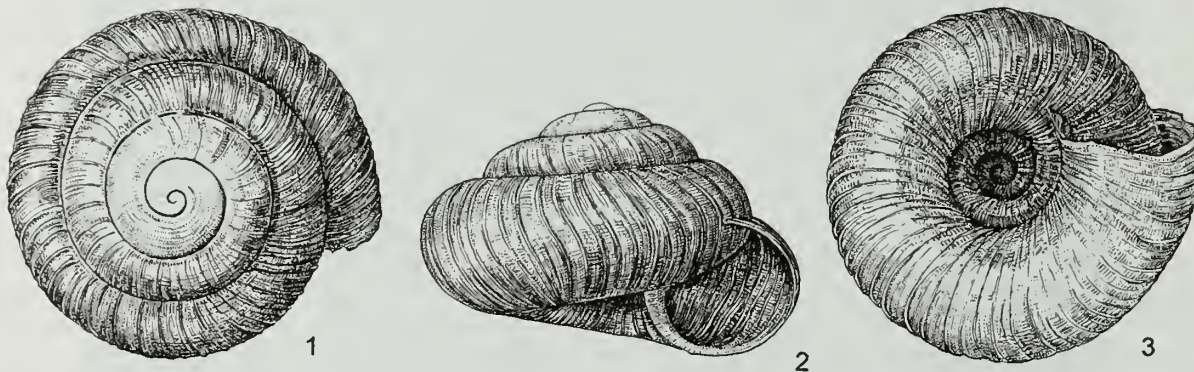
According to Solem (1976: 102-107; 1983: 53-54, 59-61) Punctidae and Charopidae are well separated by a combination of shell and anatomical characters. Small shells without anatomical data such as the ones discussed below are difficult to assign to either family. Solem (1983: 54) writing about the punctids stated: "Only a very few taxa have had other than jaw and radula data recorded in the literature, and it is quite probable that some of the included species and genera will prove to be charopids and some taxa assigned to charopids will prove to be punctids." In view of the small size of the shells studied, we have preferred to introduce the new taxon as a species of *Punctum*. However, one should realize that this is only a preliminary classification pending anatomical evaluation.

Punctum adami sp. nov.

(Figs 1-9)

Diagnosis

A species of *Punctum* with a small shell (maximum diameter <1.50 mm) with fairly depressed spire (l/d <0.75), a spirally engraved apex, a total of about four whorls covered with primary and secondary costulae, and a wide umbilicus.



Figs 1-3. *Punctum adami* sp. nov., holotype shell (RBINS), three different views, highly enlarged, actual size 0.81 x 1.12 mm (No. 5 in Table 1), D.R. Congo, Virunga National Park, northern sector, Ruwenzori, between Kiondolire and Kalonge, 1750-2200 m. Mrs J. Van Melderden-Sergysels del.

Description

Shell minute (maximum diameter <1.50 mm), thin, subglobose, with fairly depressed spire (l/d <0.75), widely umbilicate; fresh shell colourless,

semitransparent to very pale brownish. Spire with about four convex whorls, regularly increasing in size, apical whorls covered with incised spiral sculpture, later whorls with comparatively distant, fine and oblique (sometimes variously developed)

costulae, little prominent under low magnification, interstices with five to six secondary costulae; all whorls show some weak spiral sculpture, never resulting in a reticulate pattern. Sculpture weaker on underside of shell than on upper side. Aperture almost circular in front view, although always (slightly) wider than high, labrum sharp, but sometimes very slightly reflected and somewhat paler in colour than the body whorl. Umbilicus wide and deep, reaching almost to the apex of the shell. Measurements of shell (height x diameter): 0.75-0.87 x 1.06-1.26 mm, l/d 0.67-0.74, aperture height x width 0.34-0.50 x 0.38-0.50 mm, whorls 3 1/4->4; holotype (Figs 1-3, No. 5 in Table 1) 0.81 x 1.12 mm, l/d 0.72, aperture 0.34 x 0.38 mm, slightly less

| No. | locality | height x maj. diam. | l/d | aperture | whorls |
|-----|----------------|---------------------|------|-------------|-----------------------------------|
| 1 | PNV 429 | 0.75 x 1.06 | 0.70 | 0.43 x 0.43 | 3 1/4 |
| 2 | PNV 429 | 0.75 x 1.12 | 0.67 | 0.43 x 0.43 | >3 1/4 |
| 3 | PNV 429 | 0.75 x 1.12 | 0.67 | 0.43 x 0.47 | 3 3/4 |
| 4 | Mahungu-Kiondo | 0.78 x 1.12 | 0.69 | 0.43 x 0.43 | 3 3/4 |
| 5* | Kiondolire | | | | |
| | -Kanonge | 0.81 x 1.12 | 0.72 | 0.34 x 0.38 | <4 |
| 6 | Mahungu-Kiondo | 0.81 x 1.19 | 0.68 | 0.50 x 0.50 | 3 3/4 |
| 7 | PNV 429 | 0.87 x 1.19 | 0.74 | 0.43 x 0.43 | <4 |
| 8 | Mahungu-Kiondo | 0.87 x 1.25 | 0.70 | 0.43 x 0.50 | <4 |
| 9 | Mahungu-Kiondo | 0.87 x 1.25 | 0.70 | 0.50 x 0.50 | apex defective |
| 10 | PNV 429 | 0.87 x 1.26 | 0.67 | damaged | >4 [4 1/2?] [aperture damaged] |

Table 1. Measurements in mm of ten shells of the type series of *Punctum adami* sp. nov. Aperture dimensions are height x major diameter. No. 5* is the holotype (RBINS, Figs 1-3); No. 6 is the specimen depicted in Figs 4-5 (RMNH), No. 4 that of Figs 6-7 (RBINS), and No. 3 that of Figs 8-9 (RMNH).

Material examined

D.R. Congo, Kivu Province, Virunga National Park, northern sector, Ruwenzori, between Kiondolire and Kalonge, in moss on trees, 1750-2200 m, II.1957, leg. P. Vanschuytbroeck (holotype RBINS, Figs 1-3); northern sector, Ruwenzori, Kerere (3800 m), between Mahungu (3300 m) and Kiondo (4300 m), in moss, II.1957, leg. P. Vanschuytbroeck (10 paratypes RBINS, Figs 6-7; 2 paratypes RMNH, Figs 4-5); northern sector, Ishango², northern side of Lake Edward, close to Semliki River, 915 m, 18.III.1953, leg. P. Vanschuytbroeck & J. Kekenbosch (PNV 429, 3 paratypes RBINS; 2 paratypes RMNH, Figs 8-9).

² It is possible that label PNV429 refers to another exploration; the locality should then be: southern sector, near Busholinka River in the Rutshuru region (ex PNV), sifting, ± 1,350 m, 20.V.1957, leg. G.F. de Witte.

than 4 whorls (see Table 1).

Distribution

Punctum adami is so far only known from the northern sector of the Virunga National Park on the eastern border of the D.R. Congo; all known localities are between 915 and 3800 m.

Type locality

D.R. Congo, Kivu Province, Virunga National Park, northern sector, Ruwenzori, between Kiondolire and Kalonge, 1750-2200 m.

Etymology

The new taxon is named after the malacologist Dr W. Adam (see introduction). The material and the drawings were found under a manuscript name referring to the Ruwenzori Mts. However, in view of the existence of the name *Trachycystis ruwenzoriensis* Smith, 1904 (ostensibly a charopid in the endodontoid complex of families), it was thought advisable to use the here proposed name *Punctum adami*. According to Pilsbry (1919: 46; see also Verdcourt, 1983: 227) *Trachycystis ruwenzoriensis* is now called *Halolimnohelix ruwenzoriensis*, which classifies this nominal taxon with an altogether different family (Hygromiidae in the helicoid complex).

Discussion

A differential diagnosis is well-nigh impossible, so that we will restrict ourselves to comparison of the new taxon with minute punctids and charopids from Central and Southern Africa. Much of the original

material of these is in the Natural History Museum, London (BM), and has been studied by the senior author over a prolonged period between 1967 and 1994. As the main diversity of these groups, *i.e.* the largest number of nominal species, occurs in the south, we will start with southern Africa by checking through Connolly's monograph (1939), updated whenever more recent literature is available and including Zambia and Malawi.

Punctidae and Charopidae from southern Africa, Zambia and Malawi.

Southern African Punctidae are few and far between. Connolly (1939: 257-259) enumerates only *Punctum hottentotum* (Melvill & Ponsonby, 1891) and *P. pallidum*. The former is now classified with the genus *Toltecia* because of the absence of spiral sculpture on the protoconch. Van Bruggen (1993: 109) states that this nominal species "appears to belong to an almost world-wide complex, for which the oldest name available is *Paralaoma caputspinulae* (Reeve 1852)".

- *P. pallidum* Connolly, 1922 (Connolly, 1939: 258; van Bruggen & Meredith, 1984: 161; van Bruggen, 1988: 11; Verdcourt, 1991a: 357; 1991b: 373, Figs 14a-c). In most respects (size, l/d, apical sculpture, aperture) *P. pallidum* is rather similar to the new species. A closer scrutiny reveals that in *P. pallidum* the axial sculpture is less pronounced resulting in a more silky appearance while at the same time the umbilicus is narrower than in *P. adami*, although this is difficult to quantify. Among Dr Adam's papers we found two series of drawings of *P. pallidum*, the first of a paratype from Mt. Vengo, Mozambique (Figs 10-12), and the second of a shell from the Upemba National Park (Parc National de l'Upemba, Katanga / Shaba), D.R. Congo (Figs 13-15). The number of whorls clearly indicates the paratype to be a juvenile or at most subadult shell. Another difference is that *P. pallidum* at the same size has approximately half a whorl more than *P. adami*. In the drawings the costulation has been somewhat too emphasized for the enlargement shown. For further discussion see below. Incidentally, the Upemba National Park specimens here represent the first published material of the species from the D.R. Congo. The widely distributed *P. pallidum* is normally not found at high altitudes (Mozambique, Malawi, Zambia, D.R. Congo).

Next the new taxon has to be compared to *Trachycystis* s.l. species. Connolly (1939: 187-248) enumerates and discusses all then known southern African *Trachycystis* s.l. Few have been added since, the shell of none of which is of minute size. Among Connolly's taxa there are nine nominal species with minute shells. These are compared to *Punctum adami*

and the result is as follows:

- *T. rudicostata* Connolly, 1922 (Connolly, 1939: 205; van Bruggen & Meredith, 1984: 162); l/d 0.50, *i.e.* the shell is much flatter than in *P. adami*; moreover the aperture of *T. rudicostata* is nearly circular with the ends of the peristome close together (KwaZulu-Natal, Mozambique, Malawi).

- *T. soror* Connolly, 1922 (Connolly, 1939: 207; van Bruggen & Meredith, 1984: 162; van Bruggen, 1988: 11); l/d 0.53, so that the shell is flatter and with a major diameter of 1.5 mm also somewhat larger than that of the new species (Mozambique, Malawi, Zambia).

- *T. ordinaria* (Connolly, 1939: 207; van Bruggen, 1985: 289); although this taxon normally would not qualify because of its greater shell size, it is subject to some variation as regards dimensions (see discussion in van Bruggen, 1985: 289-290) - however, with l/d values of 0.52-0.62 it is always more depressed than *P. adami* shells and the apical whorls are always smooth to at most punctate (South Africa, Lesotho: uplands).

- *T. mcdowellii* Connolly, 1922 (Connolly, 1939: 221; van Bruggen & Appleton, 1977: 34; van Bruggen & Meredith, 1984: 162; van Bruggen, 1988: 11); with a major diameter of 1.4-1.7 mm and l/d values of 0.47-0.55, this shell is too large and too depressed and it also has a very weak axial sculpture (KwaZulu-Natal, Mozambique, Malawi, Zambia).

- *T. ferarum* Connolly, 1932 (Connolly, 1939: 222); shell 0.8 x 1.7 mm, l/d 0.47, therefore too large and too flat, moreover, the umbilicus is comparatively narrow (KwaZulu-Natal: Drakensberg range >1700 m).

- *T. vengoensis* Connolly, 1922 (Connolly, 1939: 222); shell 0.4 x 1.45 mm, l/d 0.27, the spire is far too flat and the shell diameter too large, moreover, the protoconch is reticulate (Mozambique).

- *T. spissisculpta* Connolly, 1932 (Connolly, 1939: 223); shell 1.0 x 1.8 mm, l/d 0.55, *i.e.* too large and somewhat too flat, also with a strong spiral sculpture (KwaZulu-Natal: Drakensberg range >1700 m).

- *T. pura* Connolly, 1922 (Connolly, 1939: 223; van Bruggen, 1993: 106); shell 0.7 x 1.2-1.4 mm, l/d 0.50-0.58, whorls 3 1/2, *i.e.* too depressed and too few whorls for its size; this shell also has a different sculpture in the apex being costulate rather than spirally engraved (Eastern Cape, Mozambique, Malawi).

- *T. microscopica* (Krauss, 1848), (Connolly, 1939: 224; Herbert & Warén, 1999: 226, 239); l/d 0.85-0.91, therefore far too little depressed as compared to *P. adami*, moreover, the apex is micropunctate and the umbilicus is far too narrow. Herbert & Warén (1999: 227) even doubt its identity as an endodontoid, suggesting it to be a juvenile *Nesopupa* or *Pupilla*. (KwaZulu-Natal).

Punctidae and Charopidae from East Africa (Kenya, Uganda, Tanzania).

Verdcourt's checklist (1983: 220) contains five species of *Punctum* of which only two are named. Two other taxa are provisionally named and one shown as "*P.sp.*". Verdcourt (1988) adds another *Punctum*, originally described as a *Trachycystis*. However, the student is particularly referred to his 1991 papers (Verdcourt, 1991a-b) which are of great value and importance for comparative studies of minute East African endodontoids *s.l.*

- *P. kilimanjaricum* Verdcourt, 1978 (Verdcourt, 1978: 19; 1991a: 359; 1991b: Figs 16a-c) has a shell that is larger than that of *P. adami* (*i.e.* major diameter 2.0-2.25 mm with >4 whorls) and also has a hardly depressed spire (l/d 0.84-0.90) (Tanzania: Mt. Kilimanjaro at 4050 m).

- *P. ugandanum* (Smith, 1903) is discussed in detail by Verdcourt (1988; 1991a: 356; 1991b: 373 Fig. 9). Apart from growing to a major diameter of 2.12 mm with 3 3/4 whorls, it also has a depressed spire (l/d 0.52-0.54) and the apical whorls are pitted (Kenya uplands).

Verdcourt (1983: 220) enumerates for East Africa (Kenya, Uganda, Tanzania) about a dozen species of *Trachycystis*, although none has been recorded from Uganda or western Tanzania. Again, reference should be made to his 1991 papers (Verdcourt, 1991a-b). Of these, the following two species qualify because of their size.

- *T. igembiensis* Connolly, 1925 (Verdcourt, 1983: 220 "perhaps a *Punctum*"; Verdcourt, 1991a: 358); with dimensions 1.0 x 1.7 mm, l/d 0.59, whorls 4, spiral sculpture on apex, deep umbilicus exposing all the whorls, this seems close to *P. adami* - however, apart from being somewhat too depressed, the shell is markedly costulate with coarse spiral striae, which are striking differences (Kenya uplands).

- *T. lamellosa* Pfeiffer, 1952 [not to be confused with *T. lamellifera* (Smith, 1903)] (Verdcourt, 1983: 220; 1991a: 359; 1991b: 373 Figs 11a-c, albeit with a ?); with dimensions 0.95 x 1.75 mm, l/d 0.54 and 3 3/4 whorls, this seems close enough to *P. adami*, but the shell is somewhat too depressed and the apex is smooth (Tanzania, Mt. Meru).

Punctidae and Charopidae from D.R. Congo.

As regards the former Belgian Congo, Pilsbry (1919: 46) discusses *Trachycystis ruwenzoriensis* Smith, 1909, which is not an endodontoid (see above sub Etymology) and on p. 300 mentions *Gonyodiscus ponsonbyi* Dautzenberg & Germain, 1914, and *G. smithi* Dautzenberg & Germain, 1914. Both the latter are from Katanga and are more or less in the size range of *Punctum adami*. Pilsbry states: "They are more like *Punctum*, or they may possibly be related

to the South African *Trachycystis*." *G. ponsonbyi* has a depressed shell (l/d 0.50) and there is no mention of spiral sculpture. *G. smithi* is equally depressed (l/d 0.55) and has a smooth apex.

Punctidae and Charopidae from elsewhere in Africa.

Most data below are extracted from Verdcourt (1991a-b). Because of their size only two taxa have to be discussed here.

- *Punctum cryophilum* (von Martens, 1865) (Verdcourt, 1991a: 353, includes further references: 1991b: 372, Fig. 1a-c) from Ethiopia, Simien Province, Bayeta (about 3000 m), with a shell of 1.2 x 2.0 mm is also considerably larger than *P. adami*. There are no explicit data on the apical sculpture. However, Verdcourt's remark (Verdcourt, 1991a: 354 "The possible conspecificity of *cryophilum* and *hottentotum* should be borne in mind . . ." implies that the apex is granulate or pitted and not spirally engraved (Ethiopia, Eritrea).

- *Punctum brucei* (Jickeli, 1874) (Verdcourt, 1991a: 355; 1991b: 373, Figs 6a-c) from Mekerka, Ethiopia. Original description (1.33 x 1.87 mm, l/d 0.71, whorls <3) and figures by both Jickeli and Verdcourt give some indications, but this nominal species is hard to evaluate until more material becomes available. It is clear that it does differ from *P. adami* in having a larger shell with fewer whorls and a very narrow umbilicus. The various authors do not supply data on the sculpture of the apical whorls (Ethiopia).

The main diversity of the Charopidae is in the south of the continent reaching its limits somewhere in the north of East Africa (southern Ethiopia?) (van Bruggen, 1980: 220 - "0° (Equator, Kenya)": Verdcourt, 1983: 220 - about 3-4° N in East Africa). There may be a few charopids further north. Probably the family hardly extends westward into Central/West and West Africa.

The conclusion of the foregoing is that *Punctum adami* sp. nov. probably is a taxon that appears to be as yet unknown. Its relationships are unclear and it is not even certain that it is a representative of *Punctum* rather than *Trachycystis s.l.* If indeed a species of *Punctum*, then it is similar to *P. pallidum*, which, however, does not seem to occur at elevated altitudes (from uplands not all that far above sea level to exceptionally 2350 m in Malawi). *P. pallidum* is a forest dweller and therefore lives in an eternally humid and sheltered environment on the forest floor. *P. adami* on the other hand, has so far been recorded from open and exposed habitat at great altitudes - certainly a less than desirable environment even for minute snails. Would *P. adami* be a high altitude form of *P. pallidum*? As far as known, the distribution of the latter does not reach further north than southern D.R. Congo (Katanga: Upemba

National Park), unless some of Verdcourt's taxa (Verdcourt, 1991a-b) also represent *P. pallidum*. For the time being *P. adami* is considered a taxon on its own but obviously closely similar to *P. pallidum* as regards its shell.

At least attention is now drawn to what is here termed *P. adami* by means of a published description and hopefully adequate figures so that it may be recognized by future workers. The size of the shell makes *P. adami* one of the smallest land snails in the Afrotropical Region, which will preclude a rapid increase in the knowledge of its distribution. A quote from Verdcourt (1991b: 375) should form a fitting end to the present paper. After lamenting the general poor knowledge of the minute endodontoids, he writes: "These notes serve to show, however, that the group is widespread in East Africa. With the exception of *T. ariel* which can occur as low as about 200 m the rest extend from 1400 to over 4000 m and definitely belong to montane or submontane associations. With the exception of *Haplohelix* and various Vitrinidae *Punctum* is the only other genus to occur above 4000 m in East Africa."³

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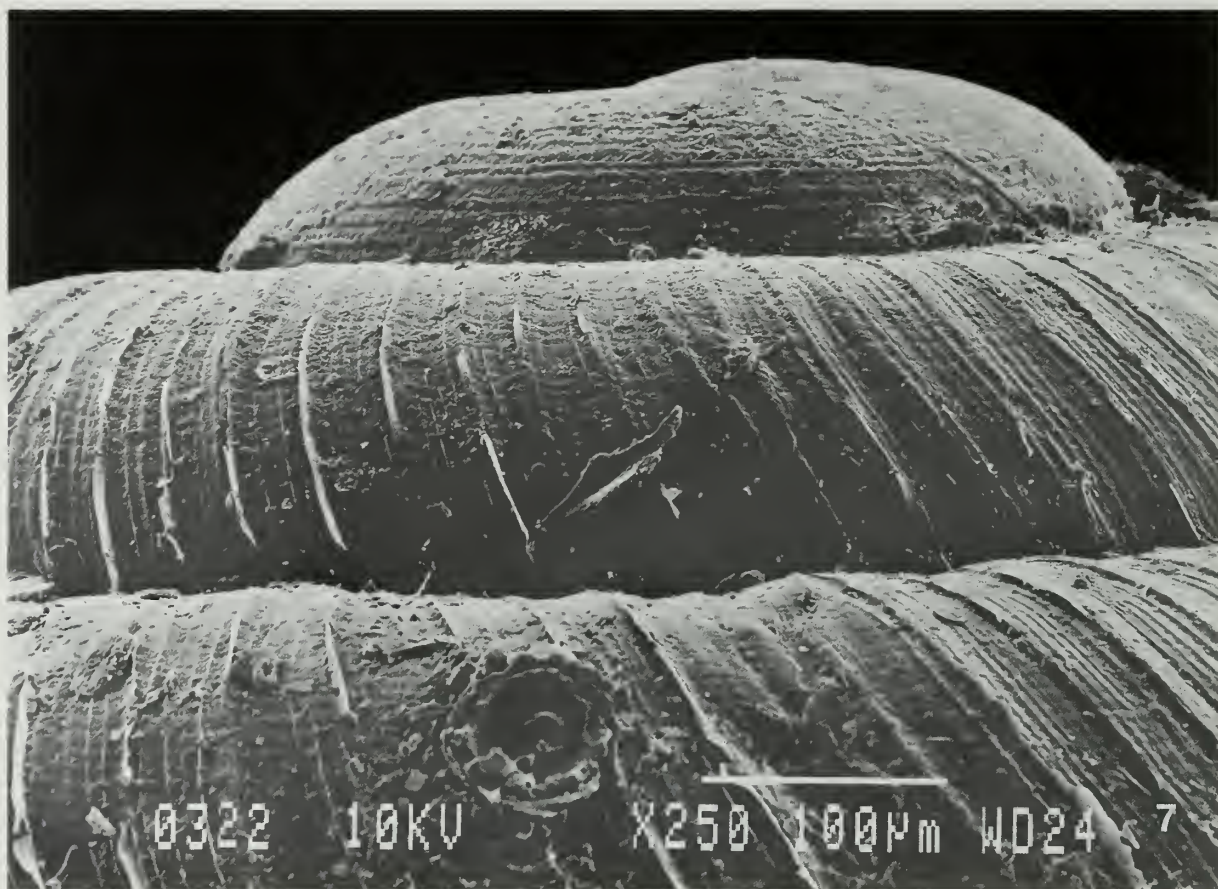
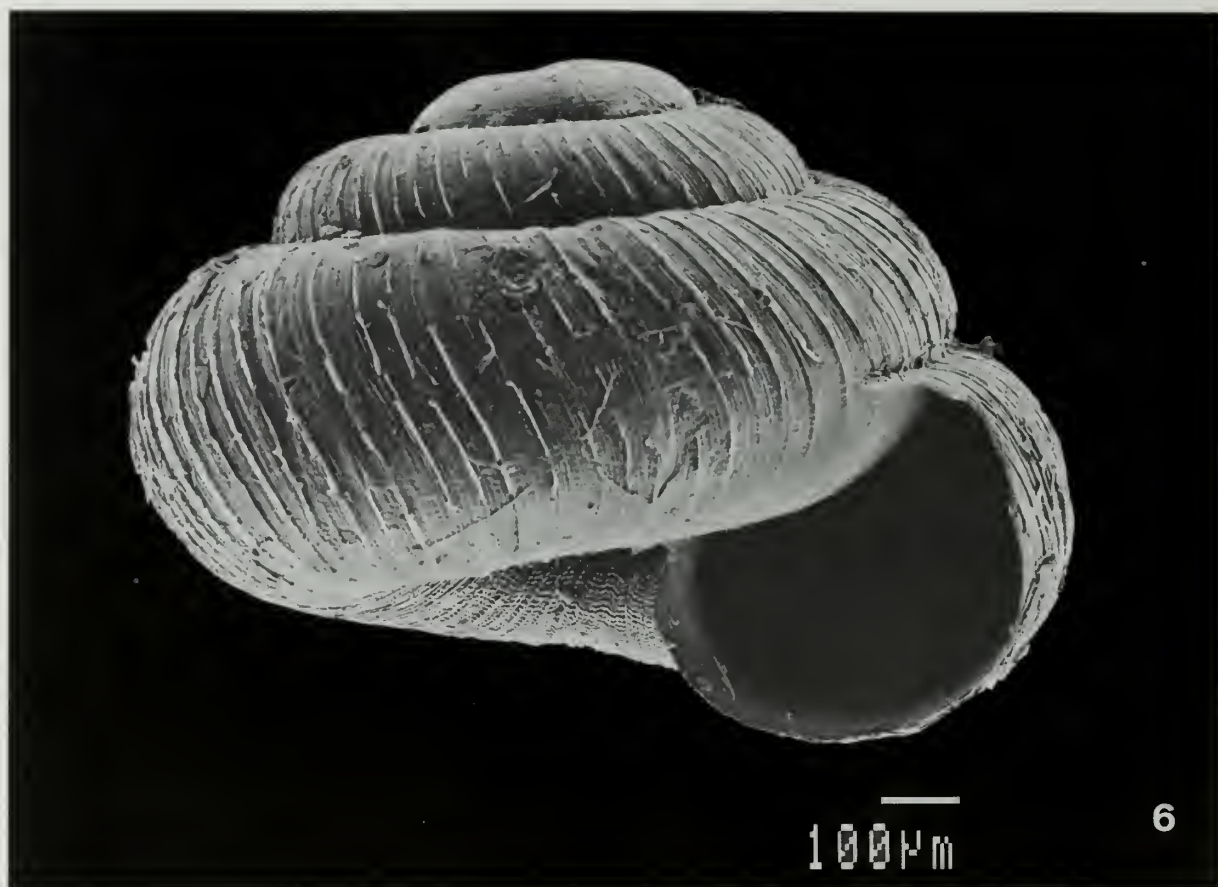
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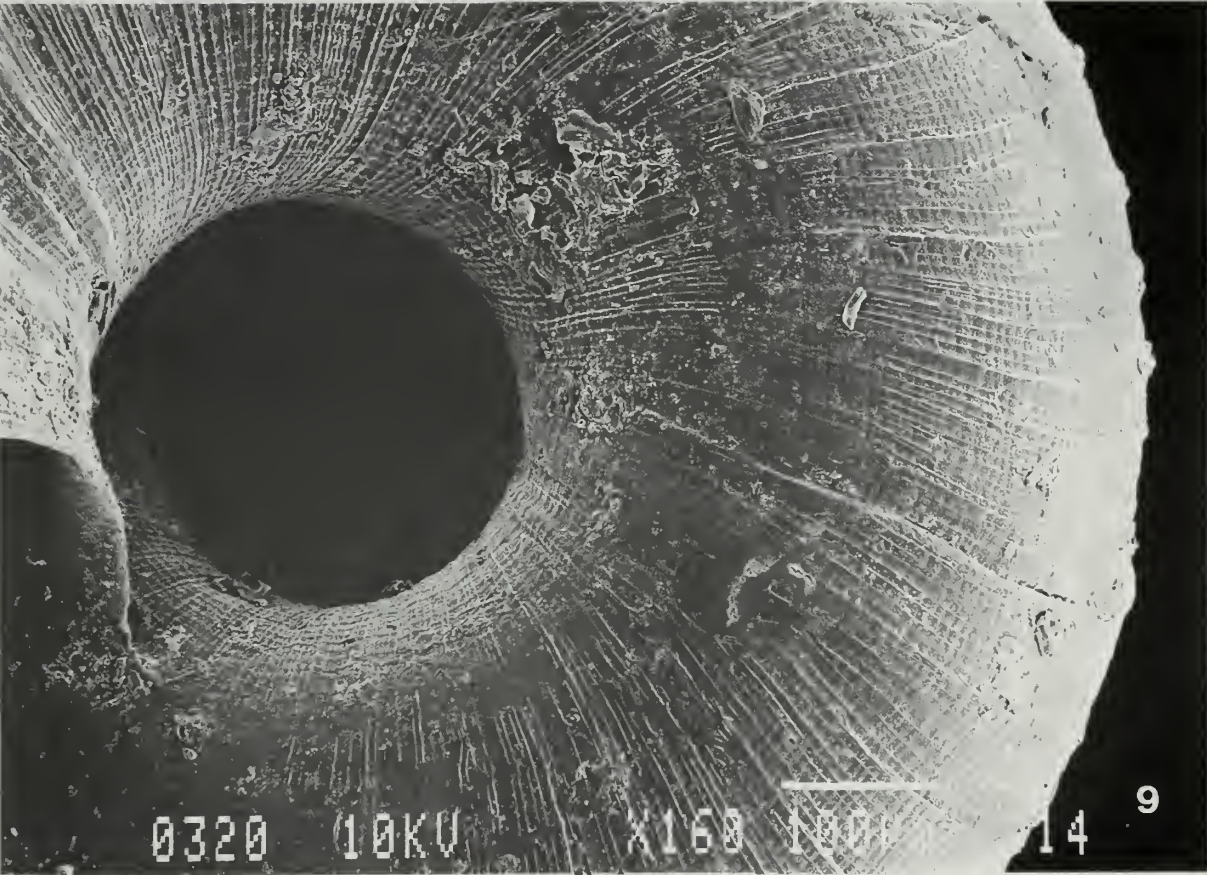
³ Verdcourt has overlooked the high altitude streptaxids (up to 4,200-4,600 m); for discussion see van Bruggen & Van Goethem (1999: 37).

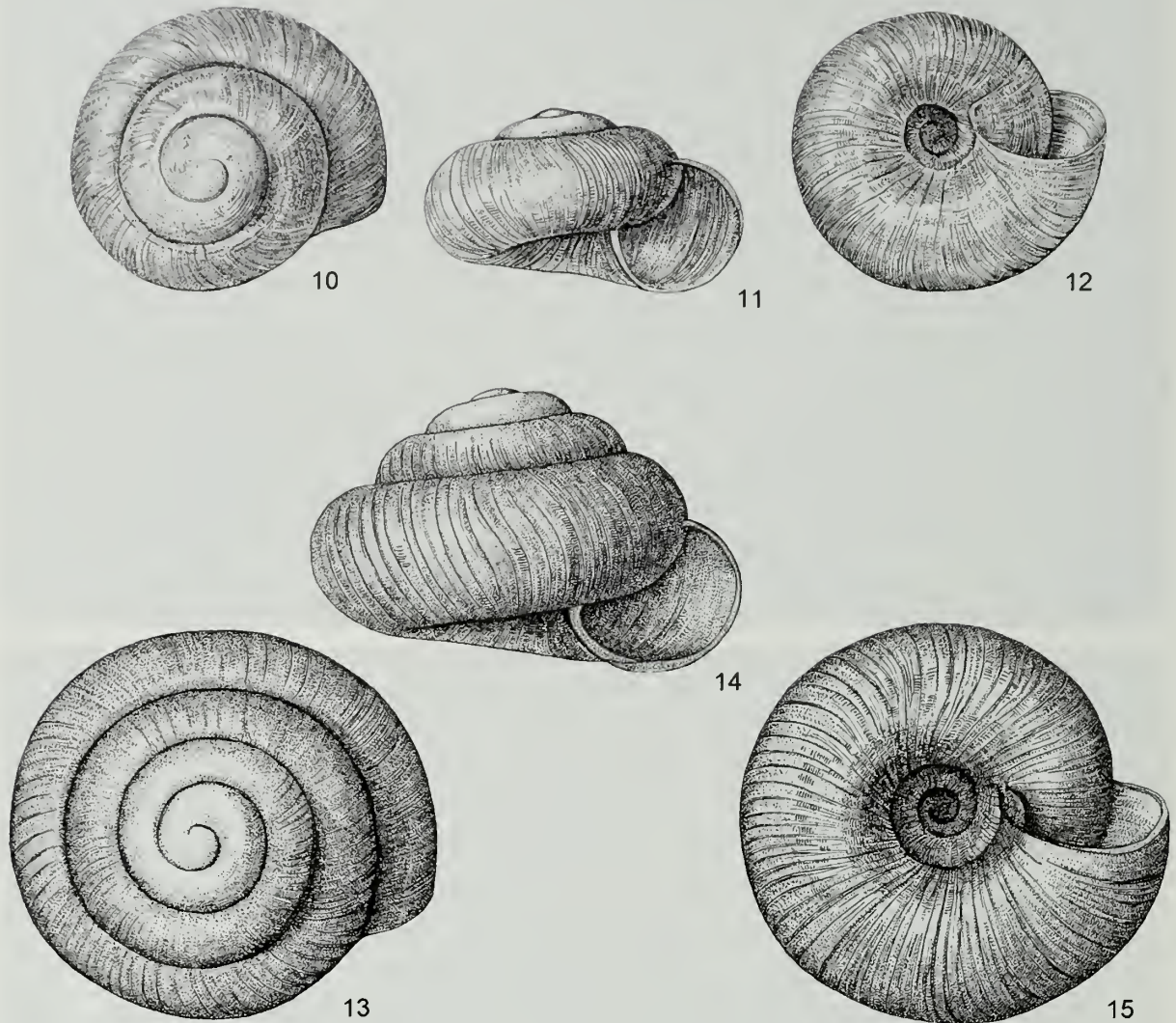
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Figs 4-9. *Punctum adami* sp. nov., S.E.M. photographs of three aspects of three different paratypes; 4-5, PNV: Mahungu-Kiondo (RMNH, No. 6 in Table 1), top view; 6-7, PNV: Mahungu-Kiondo (RBINS, No. 4 in Table 1), front view; 8-9, PNV 429 (RMNH, No. 3 in Table 1), bottom view. N.B. only the scale bars give correct measurements; enlargement shown refers to original size of photographs. S.E.M. photographs J. Goud (RMNH).









Figs 10-15. *Punctum pallidum* Connolly, 1922. 10-12, three views of paratype shell from Mozambique, 'Macequece' (= Vila de Manica, 18° 56' S 32° 53' E), Mt. Vengo, leg. B. Cressy, don. M. Connolly 12.V.1925, highly enlarged, actual size 0.65 x 1.00 mm, l/d 0.66, aperture 0.43 x 0.43 mm (RBINS); 13-15, three views of specimen from D.R. Congo, Katanga / Shaba, Upemba National Park (PNU 749: Katongo, gallery forest, 1750 m), 15-21.IV.1948, leg. Dr W. Adam, highly enlarged, actual size 0.87 x 1.37 mm, l/d 0.64, aperture 0.50 x 0.50 mm (RBINS). Mrs J. Van Melderren-Sergysels del.